Course No.	Course Name	L-T-P - Credits	Year of Introduction
MA204	Probability distributions, Random Processes and Numerical Methods	3-1-0-4	2016

Prerequisite: Nil

Course Objectives

- To introduces the modern theory of probability and its applications to modelling and analysis and processing of random processes and signals.
- To learn most of the important models of discrete and continuous probability distributions and widely used models of random processes such as Poisson processes and Markov chains.
- To understand some basic numerical methods for interpolation and integration and also for finding roots of equations and solutions of ODEs.

Syllabus

Discrete random variables- Continuous Random variables-Multiple Random variables.
Random Processes- Autocorrelation, Power spectrum-Special Random Processes.
Numerical Methods.

Expected outcome .

At the end of the course students would have become familiar with quantifying and analysing random phenomena using various models of probability distributions and random processes. They would also have learned the concepts of autocorrelation and power spectral density which are useful in the analysis of random signals. Some of the fundamental numerical methods learned in the course would help them to solve a variety of mathematical problems by the use of computers when analytical methods fail or are difficult.

Text Book:

1. V.Sundarapandian, "Probability, Statistics and Queueing theory", PHI Learning, 2009
2. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th edition, Wiley, 2015.

References:

1. Hossein Pishro-Nik, "Introduction to Probability, Statistics and Random Processes", Kappa Research, 2014 (Also available online at www.probabilitycourse.com)
2. OliverC.Ibe,FundamentalsofAppliedProbabilityandRandomProcesses"Elsevier,2005.
3. T Veerarajan "Probability Statistics and Random Process" Third edition-Mc Graw Hill.
4. Numerical Mathematical and computing –Ward-Cheney-Cengage Learning-7th Edition

Course Plan

Module	Contents	Hours	Sem. Exam Marks
I	**Discrete random variables [Text 1: Relevant portions of sections 2.1, 2.2,2.3, 2.5, 3.3 and 3.4]** Discrete random variables, probability mass function, cumulative distribution function, expected value, mean and variance. Binomial random variable-, mean, variance.	3 2	15%

	Poisson random variable, mean, variance, approximation of binomial by Poisson. Distribution fitting-binomial and Poisson.	2 2	
II	**Continuous random variables [Text 1: Relevant portions of sections 2.4, 2.5, 3.7, 3.8 and 3.11]** Continuous random variables, Probability density function, expected value, mean and variance. Uniform random variable-, mean, variance. Exponential random variable-mean, variance, memoryless property. Normal random variable-Properties of Normal curve mean, variance (without proof), Use of Normal tables.	 2 2 2 3	15%
FIRST INTERNAL EXAMINATION			
III	**Joint distributions [Text 1: Relevant portions of sections 4.1, 4.2, 4.4 4.7and 4.10]** Joint probability distributions- discrete and continuous, marginal distributions, independent random variables. Expectation involving two or more random variables, covariance of pairs of random variables. Central limit theorem (without proof).	 4 3 2	15%
IV	**Random processes [Text 1: Relevant portions of sections 5.1, 5.2, 5.3 and 6.2]** Random processes, types of random processes, Mean, correlation and covariance functions of random processes, Wide Sense Stationary (WSS) process, Properties of autocorrelationand auto covariance functions of WSS processes. Power spectral density and its properties.	 2 4 2	15%
SECOND INTERNAL EXAMINATION			
V	**Special random processes [Text 1: Relevant portions of sections 5.5, 5.5.1, 5.5.2, 5.5.3,5.5.4) and 5.6]** Poisson process-properties, probability distribution of inter arrival times. Discrete time Markov chain- **T**ransition probability matrix, Chapman Kolmogorov theorem (without proof), computation of probability distribution and higher order transition probabilities, stationary distribution.	 4 5	20%
VI	**Numerical Methods [Text 2: Relevant portions of sections 19.2, 19.3, 19.5 and 21.1]** (Derivation of formulae not required in this module) Finding roots of equations-Newton-Raphson method. Interpolation-Newton's forward and backward difference formula, Lagrange's interpolation method. Numerical Integration-trapezoidal rule, Simpson's 1/3rd rule. Numerical solution of first order ODE-Euler method, Runge-Kutta fourth order (classical method).	 3 3 3 3	20%
END SEMESTER EXAM			

QUESTION PAPER PATTERN:

Maximum Marks : 100 Exam Duration: 3 hours

The question paper will consist of 3 parts.

Part A will have 3 questions of 15 marks each uniformly covering modules I and II. Each question may have two sub questions.

Part B will have 3 questions of 15 marks each uniformly covering modules III and IV. Each question may have two sub questions.

Part C will have 3 questions of 20 marks each uniformly covering modules V and VI. Each question may have three sub questions.

Any two questions from each part have to be answered.

COURSE CODE	COURSE NAME	L-T-P-C	YEAR OF INTRODUCTION
EC202	SIGNALS & SYSTEMS	3-1-0-4	2016

Prerequisite: Nil

Course objectives:

1. To train students for an intermediate level of fluency with signals and systems in both continuous time and discrete time, in preparation for more advanced subjects in digital signal processing, image processing, communication theory and control systems.
2. To study continuous and discrete-time signals and systems, their properties and representations and methods those are necessary for the analysis of continuous and discrete-time signals and systems.
3. To familiarize with techniques suitable for analyzing and synthesizing both continuous-time and discrete time systems.
4. To gain knowledge of time-domain representation and analysis concepts as they relate to differential equations, difference equations, impulse response and convolution, etc.
5. To study frequency-domain representation and analysis concepts using Fourier analysis tools, Laplace Transform and Z-transform.
6. To study concepts of the sampling process, reconstruction of signals and interpolation.

Syllabus:

Elementary Signals, Continuous time and Discrete time signals and systems, Signal operations, Differential equation representation , difference equation representation, continuous time LTI systems, Discrete Time LTI systems, Correlation between signals, orthogonality of signals. Frequency domain representation, Continuous time Fourier Series ,Continuous Time Fourier Transform, Laplace Transform, Inverse transform, unilateral Laplace Transform, transfer function, Frequency response, sampling , aliasing, Z transform ,Inverse transform , unilateral Z transform, Frequency domain representation of Discrete Time Signals, Discrete Time Fourier Series and Discrete Time Fourier Transform (DTFT), Analysis of Discrete Time LTI systems using all transforms

Expected outcome:

1.Define, represent, classify and characterize basic properties of continuous and discrete time signals and systems.
2.Represent the CT signals in Fourier series and interpret the properties of Fourier transform, Laplace transform
3.Outline the relation between convolutions, correlation and to describe the orthoganality of signals.
4.Illustrate the concept of transfer function and determine the Magnitude and phase response of systems.
5.Explain sampling theorem and techniques for sampling and reconstruction.
6.Determine z transforms, inverse z transforms signals and analyze systems using z transforms.

Text Books:

1. Alan V. Oppenheim and Alan Willsky, Signals and Systems, PHI, 2/e, 2009
2. Simon Haykin Signals & Systems, John Wiley, 2/e, 2003

References:

1. Anand Kumar, Signals and Systems, PHI, 3/e, 2013.
2. Mahmood Nahvi, Signals and System, Mc Graw Hill (India), 2015.
3. P Ramakrishna Rao, Shankar Prakriya, Signals and System, MC Graw Hill Edn 2013.
4. B P. Lathi, Priciples of Signal Processing & Linear systems, Oxford University Press.
5. Gurung, Signals and System , PHI.
6. Rodger E. Ziemer Signals & Systems - Continuous and Discrete, Pearson, 4/e, 2013

Course Plan			
Module	**Course content (48 hrs)**	**Hours**	**Sem. Exam Marks**
I	Elementary Signals, Classification and Representation of Continuous time and Discrete time signals, Signal operations	4	**15**
	Continuous Time and Discrete Time Systems - Classification, Properties.	3	
	Representation of systems: Differential Equation representation of Continuous Time Systems. Difference Equation Representation of Discrete Systems.	2	
II	Continuous Time LTI systems and Convolution Integral.	3	**15**
	Discrete Time LTI systems and linear convolution.	2	
	Stability and causality of LTI systems.	2	
	Correlation between signals, orthoganality of signals.	2	
FIRST INTERNAL EXAM			
III	Frequency Domain Representation of Continuous Time Signals- Continuous Time Fourier Series and its properties.	3	**15**
	Convergence,Continuous Time Fourier Transform: Properties.	2	
	Laplace Transform, ROC, Inverse transform, properties, unilateral Laplace Transform.	3	
	Relation between Fourier and Laplace Transforms.	1	
IV	Analysis of LTI systems using Laplace and Fourier Transforms. Concept of transfer function, Frequency response, Magnitude and phase response.	3	**15**
	Sampling of continuous time signals, Sampling theorem for lowpass signals, aliasing.	3	
SECOND INTERNAL EXAM			
V	Z transform, ROC , Inverse transform, properties, unilateral Z transform.	3	**20**
	Frequency Domain Representation of Discrete Time Signals, Discrete Time Fourier Series and its properties.	3	
	Discrete Time Fourier Transform (DTFT) and its properties	3	
VI	Relation between DTFT and Z-Transform, Analysis of Discrete Time LTI systems using Z transforms and DTFT, Transfer function, Magnitude and phase response.	6	**20**
END SEMESTER EXAM			

Assignment: Convolution by graphical methods, Solution of differential equations.
Project: Use of Matlab in finding various transforms, magnitude and phase responses.

Question Paper Pattern

The question paper consists of three parts. Part A covers modules I and II, Part B covers modules III and IV and Part C covers modules V and VI. Each part has three questions. Each question can have a maximum of four subparts. Among the three questions one will be a compulsory question covering both the modules and the remaining two questions will be as one question from each module, of which one is to be answered. Mark pattern is according to the syllabus with maximum 30 % for theory and 70% for logical/numerical problems, derivation and proof.

COURSE CODE	COURSE NAME	L-T-P-C	YEAR OF INTRODUCTION
EC204	Analog Integrated Circuits	4-0-0-4	2016

Prerequisite: Nil

Course objectives:

- To equip the students with a sound understanding of fundamental concepts of operational amplifiers
- To know the diversity of operations that op amp can perform in a wide range of applications
- To introduce a few special functions integrated circuits.
- To impart basic concepts and types of data converters

Syllabus: Differential amplifier configurations, Operational amplifiers, Block diagram, Ideal op-amp parameters, Effect of finite open loop gain, bandwidth and slew rate on circuit performance, op-amp applications- linear and nonlinear, Active filters, Specialized IC and their application, Monolithic Voltage Regulators types and its Applications, Data Converters, specifications and types

Expected outcome:

- On completion of this course, the students will have a thorough understanding of operational amplifiers
- Students will be able to design circuits using operational amplifiers for various applications

Text Books:

1. Salivahanan S. ,V. S. K. Bhaaskaran, Linear Integrated Circuits, Tata McGraw Hill, 2008
2. Franco S., Design with Operational Amplifiers and Analog Integrated Circuits, 3/e, Tata McGraw Hill, 2008

References:

1. David A. Bell, Operational Amplifiers & Linear ICs, Oxford University Press, 2nd edition, 2010.
2. Gayakwad R. A., Op-Amps and Linear Integrated Circuits, Prentice Hall, 4/e, 2010.
3. R.F. Coughlin & Fredrick Driscoll, Operational Amplifiers & Linear Integrated Circuits, 6th Edition, PHI,2001
4. C.G. Clayton, Operational Amplifiers, Butterworth & Company Publ. Ltd./ Elsevier, 1971.
5. Roy D. C. and S. B. Jain, Linear Integrated Circuits, New Age International, 3/e, 2010.
6. Botkar K. R., Integrated Circuits, 10/e, Khanna Publishers, 2010.

Course Plan

Module	Course content (54hrs)	Hours	Sem. Exam Marks
I	Differential amplifiers: Differential amplifier configurations using BJT, Large and small signal operations, Balanced and unbalanced output differential amplifiers, Input resistance, voltage gain, CMRR, non ideal characteristics of differential amplifier. Frequency response of differential amplifiers, Current sources, Active load, Concept of current mirror circuits, Wilson current mirror circuits, multistage differential amplifiers.	6	15
	Operational amplifiers: Introduction, Block diagram, Ideal op-	5	

	amp parameters, Equivalent Circuit, Voltage Transfer curve, open loop op-amp configurations, Effect of finite open loop gain, bandwidth and slew rate on circuit performance		
II	Op-amp with negative feedback: Introduction, feedback configurations, voltage series feedback, voltage shunt feedback, properties of Practical op-amp.	3	**15**
	Op-amp applications: Inverting and non inverting amplifier, dc and ac amplifiers, peaking amplifier, summing, scaling and averaging amplifiers, instrumentation amplifier.	4	
FIRST INTERNAL EXAM			
III	Op-amp applications: Voltage to current converter, current to voltage converter, integrator, differentiator, precision rectifiers, log and antilog amplifier, Phase shift and Wien bridge oscillators	6	**15**
IV	Square, triangular and saw tooth wave generators, Comparators, zero crossing detector, Schmitt trigger, characteristics and limitations.	4	**15**
	Active filters, First and Second order Butterworth filter and its frequency response for LPF, HPF, BPF, BSF, and Notch filter.	5	
SECOND INTERNAL EXAM			
V	Specialized IC's and its applications: Timer IC 555 (monostable & astable operation), Voltage controlled oscillator, Analog Multiplier	4	**20**
	PLL, operating principles, Applications: frequency multiplication/division, Frequency synthesizer, AM & FM detection , FM modulator/Demodulator	4	
	Monolithic Voltage Regulators: Three terminal voltage regulators 78XX and 79XX series, IC723 , low voltage and high voltage regulator, Current boosting, short circuit and fold back protection.	4	
VI	Data Converters: D/A converter , specifications , weighted resistor type, R-2R Ladder type, switches for D/A converters, high speed sample-and-hold circuits	4	**20**
	A/D Converters: Specifications, Flash type, Counter ramp type, Successive Approximation type, Single Slope type, Dual Slope type	4	
END SEMESTER EXAM			

Question Paper Pattern

The question paper consists of three parts. Part A covers modules I and II, Part B covers modules III and IV and Part C covers modules V and VI. Each part has three questions. Each question can have a maximum of four subparts. Among the three questions one will be a compulsory question covering both the modules and the remaining two questions will be as one question from each module, of which one is to be answered. Mark pattern is according to the syllabus with maximum 30 % for theory and 70% for logical/numerical problems, derivation and proof.

COURSE CODE	COURSE NAME	L-T-P-C	YEAR OF INTRODUCTION
EC206	Computer Organisation	3-0-0-3	2016

Prerequisite: EC207 Logic circuit design

Course objectives:

- To impart knowledge in different aspects of processor design.
- To develop understanding about processor architecture.
- To impart knowledge in programming concepts.
- To develop understanding on I/O accessing techniques and memory structures.

Syllabus:

Functional units of a computer, Arithmetic Circuits, Processor architecture, Instructions and addressing modes, Execution of program, micro architecture design process, design or data path and control units, I/O accessing techniques, Memory concepts, memory interface, cash and virtual memory concepts

Expected outcome:

The student should be able to:

- Illustrate the structure of a computer
- Categorize different types of memories
- Explain various techniques in computer design.

Text Books:

1. David Money Harris, Sarah L Harris, Digital Design and Computer Architecture, Morgan Kaufmann – Elsevier, 2009

References:

1. William Stallings: "Computer Organisation and Architecture", Pearson Education.
2. John P Hayes: "Computer Architecture and Organisation", Mc Graw Hill.
3. Andrew S Tanenbaum: "Structured Computer Organisation", Pearson Education.
4. Craig Zacker: "PC Hardware : The Complete Reference", TMH.
5. Carl Hamacher : "Computer Organization ", Fifth Edition, Mc Graw Hill.
6. David A. Patterson and John L. Hennessey, "Computer Organisation and Design", Fourth Edition, Morgan Kaufmann.

Course Plan

Module	Course content (42 hrs)	Hours	Sem. Exam Marks
I	Functional units of a computer: Arithmetic Circuits – Adder- Carry propagate adder, Ripple carry adder, Basics of carry look ahead and prefix adder, Subtractor, Comparator, ALU	4	15
	Shifters and rotators, Multiplication, Division	3	
	Number System- Fixed Point & Floating Point	1	
II	Architecture – Assembly Language, Instructions, Operands – Registers, Register set, Memory, Constants	2	15
	Machine Language –R-Type, I-Type, J-Type Instructions, Interpreting Machine Language code	3	
FIRST INTERNAL EXAM			

III	Addressing Modes – register only, immediate, base, PC-relative, Pseudo – direct	3	**15**
	Steps for Executing a Program – Compilation, Assembling, Linking, Loading	3	
	Pseudoinstuctions, Exceptions, Signed and Unsigned Instructions, Floating Point Instructions	3	
IV	Microarchitecture- design process	2	**15**
	Single cycle processor, Single cycle data path, single cycle control	2	
	multi cycle processor, multi cycle data path, multi cycle control	3	
SECOND INTERNAL EXAM			
V	Memory & I/O systems – I/O accessing techniques: programmed, interrupt driven and DMA, DMA bus arbitration	3	**20**
	Memory Arrays – Bit Cells, Organization, Memory Ports Memory types- DRAM, SRAM, Register Files, ROM	3	
VI	Memory - Hierarchy, Performance analysis	1	**20**
	Cache Memory – direct mapped, multi way set associate cache, Fully associate cache	3	
	Virtual Memory – Address Translation, Page Table, Translation Look aside Buffer, Memory Protection, replacement polices	3	
END SEMESTER EXAM			

Question Paper Pattern

The question paper consists of three parts. Part A covers modules I and II, Part B covers modules III and IV and Part C covers modules V and VI. Each part has three questions. Each question can have a maximum of four subparts. Among the three questions one will be a compulsory question covering both the modules and the remaining two questions will be as one question from each module, of which one is to be answered. Mark pattern is according to the syllabus with maximum 50 % for theory and 50% for logical/numerical problems, derivation and proof.

COURSE CODE	COURSE NAME	L-T-P-C	YEAR OF INTRODUCTION
EC208	ANALOG COMMUNICATION ENGINEERING	3-0-0-3	2016

Prerequisite: EC205 Electronic circuits

Course objectives:

- To study the concepts and types of modulation schemes.
- To study different types of radio transmitters and receivers.
- To study the effects of noise in analog communication systems

Syllabus:

Elements of communication system, Need for modulation, amplitude Modulation, amplitude modulator circuit, demodulator circuit, AM transmitters, Types of AM, AM Receiver, Angle modulation: principles of frequency modulation, phase modulation, frequency modulator circuits, FM transmitters, FM receiver, Noise in communication system, Effect of noise in Analog Communication Systems, Telephone systems, standard telephone set, cordless telephones .

Expected outcome:

- Student will understand the fundamentals ideas of noises and its effect in communication system.
- Students can explain the principle and working of AM, FM, and PM system and transmitters and receivers.
- Students will be able to know the basic ideas of PSTN and advanced line communication systems.

Text Books:

1. Simon Haykin, Communication Systems, Wiley 4/e, 2006.
2. Tomasi, Electronic Communications System, Pearson, 5/e,2011.

References:

3. Dennis Roody and John Coolen, Electronic Communication, Pearson, 4/e, 2011.
4. Tomasi,Advanced Electronic Communications Systems, Pearson, **6/e**, 2012.
5. Taub ,Schilling, Saha,Principles of communication system,McGraw Hill,2013.
6. George Kennedy, ElectronicCommunication Systems, McGrawHill, 4/e, 2008.
7. Blake, Electronic Communication system, Cengage, 2/e , 2012.

Course Plan

Module	Course content (42 hrs)	Hours	Sem. Exam Marks
I	Introduction, elements of communication system, time and frequency domains, Need for modulation	2	15
	Noise in communication system, shot noise, thermal noise, white noise, partition noise, flicker noise, burst noise, signal to noise ratio, noise figure, noise temperature, narrow band noise, representation in terms of in-phase and quadrature components, envelope and phase components, sine wave plus narrow band noise.	5	
II	Amplitude modulation: Sinusoidal AM modulation index, Average power, Effective voltage and current, Nonsinusoidal modulation	4	
	Amplitude modulator circuits, Amplitude demodulator circuit,	3	

	AM transmitters		
FIRST INTERNAL EXAM			
III	AM Receiver, super heterodyne receiver, detector, tuning range, tracking, sensitivity and gain, Image rejection, double conversion, adjacent channel rejection, Automatic Gain Control (AGC).	4	**15**
	Single Sideband Modulation,Principles, Balanced Modulators, Singly & Doubly Balanced Modulators, SSB Generation, Filter Method, Phasing Method & Third Method, SSB Reception, Modified SSB Systems , Pilot Carrier SSB & ISB, Companded SSB.	5	
IV	Angle modulation: Frequency modulation, Sinusoidal FM, Frequency spectrum, modulation index ,average power, Non-sinusoidal modulation, deviation ratio, comparison of AM and FM	3	**15**
	Phase modulation, Equivalence between PM and FM, Sinusoidal Phase Modulation, Digital Phase Modulation.	3	
SECOND INTERNAL EXAM			
	Angle modulator Circuits : Varactor Diode Modulators, Transistors Modulators, FM Transmitters: Direct & Indirect Methods.	2	
V	FM receiver, slope detector, balanced slope detector, Foster-Seeley discriminator, Ratio Detector, Quadrature detector, PLL demodulator, Automatic Frequency Control, Amplitude limiters, Pre-emphasis and De-emphasis,	3	**20**
	Effect of noise in analog communication Systems- AM Systems, DSBSC AM, SSB AM, Angle modulation, Threshold Effect in Angle modulation.	4	
VI	Telephone systems, standard telephone set, basic call procedures and tones, DTMF, cordless telephones.	4	
END SEMESTER EXAM			

Assignment

Study of

1. **The telephone circuit - Local subscriber loop, Private-line circuits, Voice-frequency circuit arrangements.**
2. **The public telephone network - Instruments, Local loops, Trunk circuits and exchanges, Local central office Exchanges, Automated central office switches and Exchanges.**

Question Paper Pattern

The question paper consists of three parts. Part A covers modules I and II, Part B covers modules III and IV and Part C covers modules V and VI. Each part has three questions. Each question can have a maximum of four subparts. Among the three questions one will be a compulsory question covering both the modules and the remaining two questions will be as one question from each module, of which one is to be answered. Mark pattern is according to the syllabus with maximum 30 % for theory and 70% for logical/numerical problems, derivation and proof.

Course No.	Course Name	L-T-P-Credits	Year of Introduction
HS210	LIFE SKILLS	2-0-2	2016

Course Objectives

- To develop communication competence in prospective engineers.
- To enable them to convey thoughts and ideas with clarity and focus.
- To develop report writing skills.
- To equip them to face interview & Group Discussion.
- To inculcate critical thinking process.
- To prepare them on problem solving skills.
- To provide symbolic, verbal, and graphical interpretations of statements in a problem description.
- To understand team dynamics & effectiveness.
- To create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values, Loyalty and also to learn to appreciate the rights of others.
- To learn leadership qualities and practice them.

Syllabus

Communication Skill: Introduction to Communication, The Process of Communication, Barriers to Communication, Listening Skills, Writing Skills, Technical Writing, Letter Writing, Job Application, Report Writing, Non-verbal Communication and Body Language, Interview Skills, Group Discussion, Presentation Skills, Technology-based Communication.
Critical Thinking & Problem Solving: Creativity, Lateral thinking, Critical thinking, Multiple Intelligence, Problem Solving, Six thinking hats Mind Mapping & Analytical Thinking.
Teamwork: Groups, Teams, Group Vs Teams, Team formation process, Stages of Group, Group Dynamics, Managing Team Performance & Team Conflicts.
Ethics, Moral & Professional Values: Human Values, Civic Rights, Engineering Ethics, Engineering as Social Experimentation, Environmental Ethics, Global Issues, Code of Ethics like ASME, ASCE, IEEE.
Leadership Skills: Leadership, Levels of Leadership, Making of a leader, Types of leadership, Transactions Vs Transformational Leadership, VUCA Leaders, DART Leadership, Leadership Grid & leadership Formulation.

Expected outcome

- Communicate effectively.
- Make effective presentations.
- Write different types of reports.
- Face interview & group discussion.
- Critically think on a particular problem.
- Solve problems.
- Work in Group & Teams
- Handle Engineering Ethics and Human Values.
- Become an effective leader.

References:

- Barun K. Mitra; (2011), *"Personality Development & Soft Skills*", First Edition; Oxford Publishers.
- Kalyana; (2015) "

	Critical thinking Vs Creative thinking, Functions of Left Brain & Right brain, Convergent & Divergent Thinking, Critical reading & Multiple Intelligence.		2	
	Steps in problem solving, Problem Solving Techniques, Problem Solving through Six Thinking Hats, Mind Mapping, Forced Connections.	2		
	Problem Solving strategies, Analytical Thinking and quantitative reasoning expressed in written form, Numeric, symbolic, and graphic reasoning, Solving application problems.		2	
III	Introduction to Groups and Teams, Team Composition, Managing Team Performance, Importance of Group, Stages of Group, Group Cycle, Group thinking, getting acquainted, Clarifying expectations.	3		
	Group Problem Solving, Achieving Group Consensus.		2	
	Group Dynamics techniques, Group vs Team, Team Dynamics, Teams for enhancing productivity, Building & Managing Successful Virtual Teams. Managing Team Performance & Managing Conflict in Teams.	3		
	Working Together in Teams, Team Decision-Making, Team Culture & Power, Team Leader Development.		2	
IV	Morals, Values and Ethics, Integrity, Work Ethic, Service Learning, Civic Virtue, Respect for Others, Living Peacefully.	3		
	Caring, Sharing, Honesty, Courage, Valuing Time, Cooperation, Commitment, Empathy, Self-Confidence, Character,		2	
	Spirituality, Senses of 'Engineering Ethics', variety of moral issued, Types of inquiry, moral dilemmas, moral autonomy, Kohlberg's theory, Gilligan's theory, Consensus and controversy, Models of Professional Roles, Theories about right action, Self-interest, customs and religion, application of ethical theories.	3		
	Engineering as experimentation, engineers as responsible experimenters, Codes of ethics, Balanced outlook on.	3		

	The challenger case study, Multinational corporations, Environmental ethics, computer ethics, Weapons development, engineers as managers, consulting		2	
	engineers, engineers as expert witnesses and advisors, moral leadership, sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers(India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers(IETE), India, etc.	3		
V	Introduction, a framework for considering leadership, entrepreneurial and moral leadership, vision, people selection and development, cultural dimensions of leadership, style, followers, crises. Growing as a leader, turnaround leadership, gaining control, trust, managing diverse stakeholders, crisis management Implications of national culture and multicultural leadership Types of Leadership, Leadership Traits. Leadership Styles, VUCA Leadership, DART Leadership, Transactional vs Transformational Leaders, Leadership Grid, Effective Leaders, making of a Leader, Formulate Leadership	4 2 2	 2 2	
END SEMESTER EXAM				

EVALUATION SCHEME

Internal Evaluation

(Conducted by the College)

Total Marks: 100

Part – A

(To be started after completion of Module 1 and to be completed by 30th working day of the semester)

1. Group Discussion – Create groups of about 10 students each and engage them on a GD on a suitable topic for about 20 minutes. Parameters to be used for evaluation is as follows;

(i)	Communication Skills –	10 marks
(ii)	Subject Clarity	10 marks
(iii)	Group Dynamics -	10 marks
(iv)	Behaviors & Mannerisms -	10 marks

(Marks: 40)

Part – B

(To be started from 31st working day and to be completed before 60th working day of the semester)

2. Presentation Skills – Identify a suitable topic and ask the students to prepare a presentation (preferably a power point presentation) for about 10 minutes. Parameters to be used for evaluation is as follows;

(i)	Communication Skills*	-	10 marks
(ii)	Platform Skills**	-	10 marks
(iii)	Subject Clarity/Knowledge	-	10 marks

(Marks: 30)

* Language fluency, auditability, voice modulation, rate of speech, listening, summarizes key learnings etc.

** Postures/Gestures, Smiles/Expressions, Movements, usage of floor area etc.

Part – C

(To be conducted before the termination of semester)

3. Sample Letter writing or report writing following the guidelines and procedures. Parameters to be used for evaluation is as follows;

(i)	Usage of English & Grammar	-	10 marks
(ii)	Following the format	-	10 marks
(iii)	Content clarity	-	10 marks

(Marks: 30)

External Evaluation

(Conducted by the University)

Total Marks: 50 Time: 2 hrs.

Part – A

Short Answer questions

There will be one question from each area (five questions in total) will be asked for the examination. Each question should be written in about maximum of 400 words. Parameters to be used for evaluation are as follows;

(i) Content Clarity/Subject Knowledge
(ii) Presentation style
(iii) Organization of content

(Marks: 5 x 6 = 30)

Part – B

Case Study

The students will be given a case study with questions at the end the students have to analyze the case and answer the question at the end. Parameters to be used for evaluation are as follows;

(i) Analyze the case situation
(ii) Key players/characters of the case
(iii) Identification of the problem (both major & minor if exists)
(iv) Bring out alternatives
(v) Analyze each alternative against the problem
(vi) Choose the best alternative
(vii) Implement as solution
(viii) Conclusion
(ix) Answer the question at the end of the case

(Marks: 1 x 20 = 20)

COURSE CODE	COURSE NAME	L-T-P-C	YEAR OF INTRODUCTION
EC232	ANALOG INTEGRATED CIRCUITS LAB	0-0-3-1	2016

Prerequisite:.Should have registered for EC204 Analog Integrated Circuits

Course objectives:

- To acquire skills in designing and testing analog integrated circuits
- To expose the students to a variety of practical circuits using various analog ICs.

List of Experiments: (Minimum 12 experiments are to be done)

1. Familiarization of Operational amplifiers - Inverting and Non inverting amplifiers, frequency response, Adder, Integrator, comparators.
2. Measurement of Op-Amp parameters.
3. Difference Amplifier and Instrumentation amplifier.
4. Schmitt trigger circuit using Op –Amps.
5. Astable and Monostable multivibrator using Op -Amps.
6. Timer IC NE555
7. Triangular and square wave generators using Op- Amps.
8. Wien bridge oscillator using Op-Amp - without & with amplitude stabilization.
9. RC Phase shift Oscillator.
10. Precision rectifiers using Op-Amp.
11. Active second order filters using Op-Amp (LPF, HPF, BPF and BSF).
12. Notch filters to eliminate the 50Hz power line frequency.
13. IC voltage regulators.
14. A/D converters- counter ramp and flash type.
15. D/A Converters- ladder circuit.
16. Study of PLL IC: free running frequency lock range capture range

Expected outcome:

The student should able to:

1. Design and demonstrate functioning of various analog circuits
2. Students will be able to analyze and design various applications of analog circuits.

COURSE CODE	COURSE NAME	L-T-P-C	YEAR OF INTRODUCTION
EC230	LOGIC CIRCUIT DESIGN LAB	0-0-3-1	2016

Prerequisite: EC207 Logic circuit design

Course objectives:

- To study the working of standard digital ICs and basic building blocks
- To design and implement combinational circuits
- To design and implement sequential circuits

List of Experiments: -(Minimum 12 experiments are to be done)

1. Realization of functions using basic and universal gates (SOP and POS forms).
2. Design and Realization of half /full adder and subtractor using basic gates and universal gates.
3. 4 bit adder/subtractor and BCD adder using 7483.
4. 2/3 bit binary comparator.
5. Binary to Gray and Gray to Binary converters.
6. Study of Flip Flops: S-R, D, T, JK and Master Slave JK FF using NAND gates
7. Asynchronous Counter: Realization of 4-bit counter
8. Asynchronous Counter: Realization of Mod-N counters.
9. Asynchronous Counter:3 bit up/down counter
10. Synchronous Counter: Realization of 4-bit up/down counter.
11. Synchronous Counter: Realization of Mod-N counters.
12. Synchronous Counter:3 bit up/down counter
13. Shift Register: Study of shift right, SIPO, SISO, PIPO, PISO (using FF & 7495)
14. Ring counter and Johnson Counter. (using FF & 7495)
15. Realization of counters using IC's (7490, 7492, 7493).
16. Multiplexers and De-multiplexers using gates and ICs. (74150, 74154),
17. Realization of combinational circuits using MUX & DEMUX.
18. Random sequence generator.
19. LED Display: Use of BCD to 7 Segment decoder / driver chip to drive LED display
20. Static and Dynamic Characteristic of NAND gate (MOS/TTL)

Expected outcome:

The student should able to:

1. Design and demonstrate functioning of various combination circuits
2. Design and demonstrate functioning of various sequential circuits
3. Function effectively as an individual and in a team to accomplish the given task